WELDING PROCEDURE SPECIFICATION

WPS - 2010/1000-1 **REV. NO.:** 1 **DATE:** 7/20/2005 ****APPLICABILITY****

WELDING PROCESS: GTAW **and** SMAW- **ASME:** X **AWS:** X **OTHER:**

SUPPORTING PQR: Z-WS-3(X-X) Z-WS-4(X-X) P-WS-233 P-WS-227-1 P-WS-227-2 1-2-GTSM-1-1 P-WS-171-1

JOINT: This WPS shall be used in conjunction with the General Welding Standards (GWS) and Welding Fabrication Procedure (WFP) sections and criteria for joint details, repairs, NDE, inspection etc.

Weld Joint Type: Butt/Fillet		**Class:**	Full or Partial Penetration
See GWS 1-06 and WFP's for joint details		**Preparation:**	Thermal/Mechanical
Root Opening: 1/16 - 3/16		**Backing:**	Strap, ring or backweld
Backgrind root: On double sided joints		**Backing Mat.:**	CS strap/ring when used
Bkgrd Method: Grind or arc gouge	**GTAW Flux:** N/A		**Backing Retainer:** N/A

FILLER METALS **Class:** ER70S-X **and** E7018

A No: 1 **SFA Class:** 5.18 **and** 5.1 **F No:** 6 **and** 4 **Size:** 1/16 3/32 1/8 5/32

Insert: N/A **Insert Desc.:** N/A

Flux: Type: NA **Size:** 0

Filler Metal Note: For SMAW no pass shall be >1/2"

Weld Metal Thickness Ranges:

AWS Root Pass:	0.035	**thru**	0.436
AWS Balance:	0.035	**thru**	1.500
ASME Root Pass:	0.035	**thru**	0.436
ASME Balance:	0.035	**thru**	1.500

BASE MATERIAL **P No.** 1 **Gr No.** All **to: P No.** 1 **Gr No.** All

Spec. Mild Steel **Grade:** All **to: Spec.** Mild Steel **Grade:** All

Qualified Pipe Dia. Range: ≥ **AWS:** 24 **ASME:** 2.5

Qualified Thickness Range: **AWS:** 0.035 **thru** 1.500 **ASME:** 0.035 **thru** 1.500

QUALIFIED POSITIONS: **AWS:** All **ASME:** All **Vert. Prog.:** V/Up

Preheat Min. Temp.:	70 °F	**GAS: Shielding:**	Argon **or**
Interpass Max. Temp.:	500 °F	**Gas Composition:**	100 / 0 / 0 % 0 / 0 / %
Preheat Maintenance:	70 °F	**Gas Flow Rate cfh:**	10 **to** 25 0 **to** 0
PWHT: Time @ °F Temp.	0	**Backing Gas/Comp:**	N/A 0 %
Temp. Range:	0 °F	**Backing Gas Flow cfh:**	0 **to** 0
to	0 °F	**Trailing Gas/Comp:**	N/A 0 %

APPROVAL: Signatures on file at ENG **DATE:** 7/20/2005

WELDING CHARACTERISTICS:

Current: DCEP **and** DCEN **Tungsten Type:** ETHW-2 **Transfer Mode:** Manual

Ranges: Amps 35 **to** **Tungsten Dia.:** **Pulsing Cycle:** 0 **to** 0

Volts **to** **Background Current:** 0

Fuel Gas: N/A **Flame:** N/A **Braze temp. °F** 0 **to** 0

WELDING TECHNIQUE: **For fabrication specific requirements sucg as fittup, cleaning, grinding, PWHT and inspection criteria refer to Volume 2, Welding Fabrication**

Technique: Manual **Cleaning Method:** Wire Brush, File, Grind, Chip

Single Pass or Multi Pass: M **Stringer or Weave bead (S/W):** S/W **Oscillation:** N

GMAW Gun Angle °: 0 **to** 0 **Forehand or Backhand for GMAW (F/B):** N/A

GMAW/FCAW Tube to work distance: 0

Maximum K/J Heat Input: 0 **Travel speed:** Variable **Gas Cup Size:** #3 - 6

PROCEDURE QUALIFIED FOR:

Charpy "V" Notch: N/A **Nil-Ductil Transition Temperature:** N/A **Dynamic Tear:** N/A

Comments: Various PQRs with base material ranging from .035 (20 Gage) to .750 plate and 6" Sch. 80 (.432) pipe constitute the basis of this multi-process WPS.

Weld Layer	Manual Process	Filler Metals	Size	Amp Range	Volt Range	Travel/ipm	Nozzel Angle	Other
1	GTAW	ER70S-X	1/16	35 **to** 95	**to**	**to**	0 **to** 0	
2	SMAW-	E7018	3/32	70 **to** 95	**to**	**to**		
3	SMAW-	E7018	1/8	125 **to** 160	**to**	**to**		
4	SMAW-	E7018	5/32	140 **to** 205	**to**	**to**		
5								
6								

REM. * Weld layers are representative only - actual number of passes and layer sequence may vary due to variations in joint design, thickness and fitup.

Use of LANL Welding Procedures and Welder Qualifications for non-LANL work shall be at the sole risk and responsibility of the Subcontractor, and the Subcontractor shall indemnify and save LANL and the Government harmless from any and all claims, demands, actions or causes of action, and for any expense or loss by reason of Subcontractor's and their employees posession and use of LANL procedures and qualifications.